

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
15 January 2004 (15.01.2004)

PCT

(10) International Publication Number
WO 2004/005906 A1

(51) International Patent Classification⁷: G01N 23/223

(21) International Application Number:
PCT/IT2003/000404

(22) International Filing Date: 27 June 2003 (27.06.2003)

(25) Filing Language: Italian

(26) Publication Language: English

(30) Priority Data:
TO2002A000575 2 July 2002 (02.07.2002) IT

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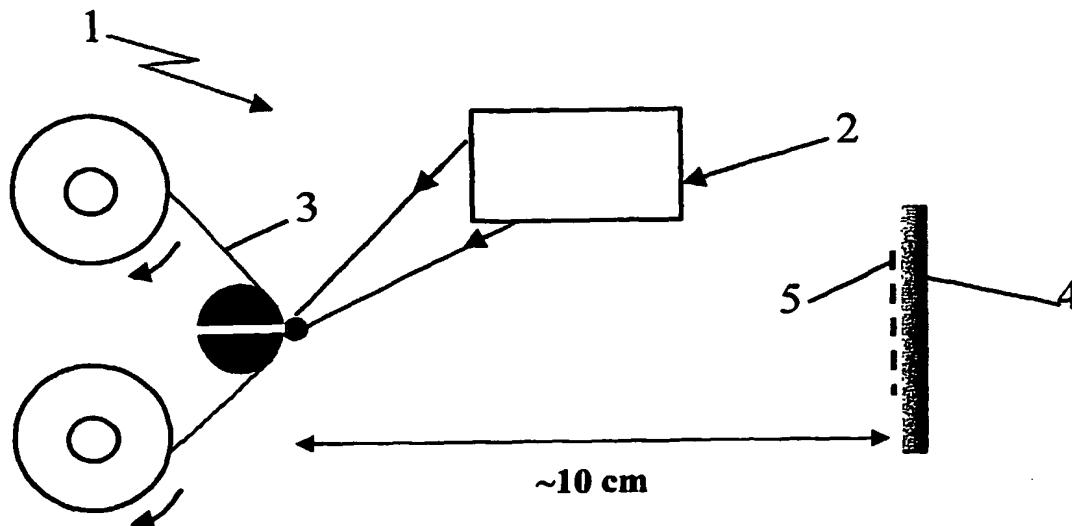
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(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

(54) Title: A METHOD FOR DETECTION OF MICROMETRIC AND SUB-MICROMETRIC IMAGES BY MEANS OF IRRADIATION OF A MASK OR OF A BIOLOGICAL SPECIMEN WITH IONIZING RADIATION



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(57) Abstract: Described herein is a method for detection of micrometric and sub-micrometric images with high resolution and high dynamics of contrast, and suited for enabling microradiography, x-ray microscopy and the production of coloured configurations in dielectric materials. The method consists of radiation of energy comprised between 20 and 2000 eV for irradiating a mask or a biological specimen and use of a detector consisting of LiF in the form of a crystal or a film. The power of the radiation released in the LiF detector during exposure is preferably $\geq 10\text{mW/cm}^2$.



ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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INTERNATIONAL SEARCH REPORT

International Application No. ..

PCT/IT 03/00404

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01N23/223

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 577 092 A (RICHARDSON MARTIN C ET AL) 19 November 1996 (1996-11-19) abstract column 4, line 41 -column 5, line 25; figure 1 ---	1-11
A	US 5 044 001 A (WANG CHIA-GEE) 27 August 1991 (1991-08-27) column 2, line 30 - line 56; figure 1 ---	1-11
A	US 5 391 879 A (MORRONE LUCIANO W ET AL) 21 February 1995 (1995-02-21) abstract column 6, line 23 - line 26; figure 1 ---	1-11 -/-

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Date of the actual completion of the international search

Date of mailing of the international search report

27 October 2003

03/11/2003

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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/IT 03/00404

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2001/006214 A1 (BOERNER ET AL) 5 July 2001 (2001-07-05) abstract; table 1 page 1, paragraph 18 -----	1-11

INTERNATIONAL SEARCH REPORT

International Application No. ...
PCT/IT/03/00404

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 5577092	A 19-11-1996	NONE		
US 5044001	A 27-08-1991	EP 0319912 A2 JP 2138856 A		14-06-1989 28-05-1990
US 5391879	A 21-02-1995	CA 2134313 A1 EP 0654683 A2 JP 7198852 A KR 164246 B1		20-05-1995 24-05-1995 01-08-1995 01-05-1999
US 2001006214	A1 05-07-2001	DE... 19961673 A1 EP 1111405 A2 JP 2001228254 A		28-06-2001 27-06-2001 24-08-2001